Precalc Warm Up # 11-5

Evaluate:

1. $\sum_{k=4}^{25} (6 - 2k)$

2. $\sum_{t=1}^{8} (-2)^t$

3. 68 + 27.2 + 10.88 + ...

1. 16, 15.5, 15, 14.5, ...

a) Find the 20th term.

b) Which term is equal to 0?

c) The sum of the first n terms is 246. Find the possible values for n.

a) $d = -0.5$ $a_{20} = 16 - 0.5(19)$

$\boxed{a_{20} = 6.5}$

b) $0 = 16 - 0.5(n-1)$

$-16 = -0.5(n-1)$

$32 = n - 1$

$\boxed{n = 33}$

c) $246 = \frac{n}{2}[2(16) - 0.5(n-1)]$

$-2(492 = 32n - 0.5n^2 + 0.5n)$

$0 = n^2 - 65n + 984$

$0 = (n - 24)(n - 41)$

$\boxed{n = 24, 41}$

2. The 5th term of a geometric series is 12 and the 7th term is 3. Find the 2 possible values of the sum to infinity of the series.

$g_5 = 12$ $g_7 = 3$

$12r^2 = 3$

$r^2 = \frac{1}{4}$

$r = \pm\frac{1}{2}$

$12 = g_1(\pm\frac{1}{2})^4$

$12 = g_1(\frac{1}{16})$

$g_1 = 192$

$S_\infty = \frac{192}{1 - \frac{1}{2}}$

$\boxed{S_\infty = 384}$

$S_\infty = \frac{192}{1 + \frac{1}{2}}$

$= \frac{192}{\frac{3}{2}}$

$= 192(\frac{2}{3})$

$\boxed{S_\infty = 128}$

3. The 5th term of a geometric sequence is 128 and the 6th term is 512.

a) Find the common ratio and the first term.

b) Which term has a value of 32,768?

c) How many terms are needed before the sum of all the terms in the sequence exceeds 100,000?

$g_5 = 128 \quad g_6 = 512$

a) $r = \frac{512}{128}$

$r = 4$

$128 = g_1(4)^4$

$g_1 = \frac{1}{2}$

b) $32{,}768 = \frac{1}{2}(4)^{n-1}$

$65536 = 4^{n-1}$

$4^8 = 4^{n-1}$

$n = 9$

c) $S_n > 100{,}000$

$\frac{0.5(1-4^n)}{1-4} > 100{,}000$

$0.5(1-4^n) < -300{,}000$

$1-4^n < -600{,}000$

$4^n > 600{,}001$

$n > \frac{\ln 600{,}001}{\ln 4}$

$n > \approx 9.60$

10 terms

4.

one million dollars?

a) $y = 25{,}000(1.03)^{10}$

$y \approx \$33{,}597.91$

b) $S_{35} = \frac{25750(1-(1.03)^{35})}{1-1.03}$

$S_{35} \approx \$1{,}556{,}898.61$

c) $g_n > 35{,}000$

$25750(1.03)^{n-1} > 35{,}000$

$(1.03)^{n-1} > \frac{140}{103}$

$(n-1)\ln(1.03) > \ln\left(\frac{140}{103}\right)$

$n > \frac{\ln\left(\frac{140}{103}\right)}{\ln 1.03} + 1$

$n > \approx 11.4$

12 years

d) $S_n = 1{,}000{,}000$

$\frac{25750(1-(1.03)^n)}{1-1.03} = 1 \text{ mil}$

$1-(1.03)^n = -\frac{120}{103}$

$1.03^n = \frac{223}{103}$

$n = \frac{\ln\left(\frac{223}{103}\right)}{\ln 1.03}$

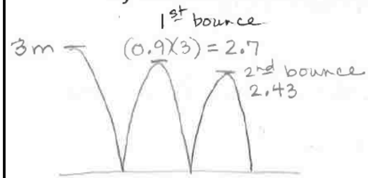
$n \approx 26.1$

27 years

5. A ball is dropped from a height of 3 m. Each time it hits the ground it bounces up to 90% of its previous height.

a) How high does it reach after the 5th bounce?

b) On which bounce does the ball first reach a maximum height of less than 1 m?



a) $g_5 = 2.7(0.9)^4$

$= 1.77147$

≈ 1.77 m

b) $g_n < 1$

$2.7(0.9)^{n-1} < 1$

$(n-1)\ln(0.9) < \ln\left(\frac{1}{2.7}\right)$

$n > \frac{\ln(1/2.7)}{\ln(0.9)} + 1$

* ln 0.9 is negative

$n > \approx 10.4$

11th bounce

SL Book

HW: p. 200 #1-7 LC